

CLAIMS

1. A method of converting a source pixel data of a first format having a plurality of three-color pixel elements for a display of a second format having a plurality of three-color pixel elements, comprising:

5 determining implied sample areas in a form of a data value for each data point of each color in said source pixel data of said first format;

determining resample areas for each emitter of each color in the display;

forming a set of fractions for each said resample area whose denominators are a function of said resample area and whose numerators are said function of an area of each  
10 of said implied sample areas that at least partially overlaps said resample areas;

15 multiplying said data value for each said implied sample area by its respective said fraction resulting in a product; and

adding each said product together to obtain luminance values for each said resample area.

2. The method of Claim 1, further comprising storing said set of fractions of said first format in display hardware.

3. The method of Claim 1, further comprising storing said set of fractions of said first format in display software.

4. The method of Claim 1, further comprising storing said set of fractions of said first format in display firmware.

5. The method of Claim 1, further comprising driving the display with said luminance values.

6. The method of Claim 1, further comprising storing said luminance values.

7. The method of Claim 1, further comprising transmitting said luminance values.

8. The method of Claim 1, wherein said data of said first format has one-half as many said three-color pixel elements horizontally and vertically as the display of said second format.

9. The method of Claim 1, wherein the display is selected from the group comprising liquid crystal displays, subtractive displays, OLEDs, electrophoretic displays, field emitter displays, discrete light emitting diode displays, plasma panel displays, EL displays, projectors, and cathode ray tube displays.

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10. A method of converting a source pixel data of a first format for a display of a second format having a plurality of three-color pixel elements, comprising:

determining implied sample areas for each data point of each color in said source pixel data of said first format;

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determining resample areas for each emitter of each color in the display;

determining for each said resample area a percentage overlap area of each overlapping said implied sample area with said resample area to obtain data values; and

multiplying said data values for each said implied sample area by said percentage overlap area resulting in a product; and

15 adding each said product together to obtain luminance values for each said resample area.

11. The method of Claim 10, further comprising storing said set of fractions of said first format in display hardware.

12. The method of Claim 10, further comprising storing said set of fractions of  
5 said first format in display software.

13. The method of Claim 10, further comprising storing said set of fractions of said first format in display firmware.

10 14. The method of Claim 10, further comprising driving the display with said luminance values.

15. The method of Claim 10, further comprising storing said luminance values.

15 16. The method of Claim 10, further comprising transmitting said luminance values.

17. The method of Claim 10, wherein said data of said first format has one-half as many said three-color pixel elements horizontally and vertically as the display of said second format.

5 18. The method of Claim 10, wherein the display is selected from the group comprising liquid crystal displays, subtractive displays, plasma panel displays, EL displays, OLEDs, electrophoretic displays, field emitter displays, discrete light emitting diode displays, projectors, and cathode ray tube displays.

10 19. A method of determining implied sample areas for each data point of each color in a source pixel data of a first format for a display of a second format having a plurality of three-color pixel elements, comprising:

determining a geometric center of each emitter of each said three-color pixel element of said first format to define sampling points;

15 defining each said implied sample area by lines that are formed equidistant between said geometric center of said emitter of one said three-color pixel element and

said geometric center of another same color said emitter of a neighboring said three-color pixel element; and

forming a grid of said lines.

5           20.   The method of Claim 19, wherein said grid of said lines is disposed in a tiling pattern.

10           21.   The method of Claim 20, wherein said tiling pattern is selected from the group comprising squares, rectangles, triangles, hexagons, octagons, diamonds, staggered squares, staggered rectangles, staggered triangles, Penrose tiles, rhombuses, distorted rhombuses, and staggered diamonds.

15           22.   A method of determining resample areas for each data point of each color in a source pixel data of a first format for a display of a second format having a plurality of three-color pixel elements, comprising:

determining a geometric center of each emitter of each said three-color pixel element;

defining each said resample area by lines that are formed equidistant between said geometric center of said emitter of one said three-color pixel element and said geometric center of another same color said emitter of a neighboring said three-color pixel element; and

5        forming a grid of said lines.

23.    The method of Claim 22, wherein said grid of said lines is disposed in a tiling pattern.

10       24.    The method of Claim 23, wherein said tiling pattern is selected from the group comprising squares, rectangles, triangles, hexagons, octagons, diamonds, staggered squares, staggered rectangles, staggered triangles, Penrose tiles, rhombuses, distorted rhombuses, and staggered diamonds.

15       25.    A method of limiting filter kernel divisors in a filter kernel to a value designed to simplify hardware implementations, comprising:

calculating areas for filter coefficients using floating point arithmetic;

dividing each said filter coefficient by a total area of a rendering area to receive a first product;

multiplying said first product by a divisor to produce a filter sum;

completing a binary search to find a round off point for said filter sum; and

5 converting said filter sum to integers.

26. The method of Claim 25, wherein said divisor is 256.

27. The method of Claim 25, further comprising using a coefficient in said  
10 filter kernel and adding a number to force said filter sum to equal said divisor.

28. The method of Claim 25, further comprising using a coefficient in said  
filter kernel and subtracting a number to force said filter sum to equal said divisor.

15 29. A method of operating spatial sampling filters, comprising:

detecting subpixel rendered areas;

turning on a first set of spatial sampling filters for said subpixel rendered areas in  
response to said detecting subpixel rendered areas;



detecting non-subpixel rendered areas; and

turning on a second set of spatial sampling filters for said non-subpixel rendered areas in response to said detecting non-subpixel rendered areas.

5           30. The method of Claim 29, wherein said detecting subpixel rendered areas comprises  $R_x \neq G_x$  and  $R_{x-2} + R_{x-1} + R_x + R_{x+1} + R_{x+2} \cong G_{x-2} + G_{x-1} + G_x + G_{x+1} + G_{x+2}$ , wherein R is a value of red, G is a value of green, and x is a pixel position in a row of pixels.

10           31. The method of Claim 29, wherein said detecting subpixel rendered areas comprises  $R_x \neq G_x$  and  $R_{x-1} + R_x + R_{x+1} + R_{x+2} \cong G_{x-2} + G_{x-1} + G_x + G_{x+2}$ , wherein R is a value of red, G is a value of green, and x is a pixel position in a row of pixels.

15           32. The method of Claim 29, wherein said detecting subpixel rendered areas comprises  $R_x \neq aG_x$  and  $R_{x-2} + R_{x-1} + R_x + R_{x+1} + R_{x+2} \cong a(G_{x-2} + G_{x-1} + G_x + G_{x+1} + G_{x+2})$ , wherein R is a value of red, G is a value of green, a is a constant, and x is a pixel position in a row of pixels.

33. The method of Claim 29, wherein said detecting subpixel rendered areas comprises  $R_x \neq aG_x$  and  $R_{x-1} + R_x + R_{x+1} + R_{x+2} \equiv a (G_{x-2} + G_{x-1} + G_x + G_{x+1})$ , wherein R is a value of red, G is a value of green, a is a constant, and x is a pixel position in a row of pixels.

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34. A machine readable medium tangibly embodying a set of instructions executable by a machine for performing a method of converting a source pixel data of a first format having a plurality of three-color pixel elements for a display of a second format having a plurality of three-color pixel elements, said method comprising:

10 determining implied sample areas in a form of a data value for each data point of each color in said source pixel data of said first format;

determining resample areas for each emitter of each color in the display;

forming a set of fractions for each said resample area whose denominators are a function of said resample area and whose numerators are said function of an area of each  
15 of said implied sample areas that at least partially overlaps said resample areas;

multiplying said data value for each said implied sample area by its respective said fraction resulting in a product; and

adding each said product together to obtain luminance values for each said resample area.

35. The device of Claim 34, further comprising storing said set of fractions of  
5 said first format in display hardware.

36. The device of Claim 34, further comprising storing said set of fractions of  
said first format in display software.

37. The device of Claim 34, further comprising storing said set of fractions of  
10 said first format in display firmware.

38. The device of Claim 34, further comprising driving the display with said  
luminance values.

39. The device of Claim 34, further comprising storing said luminance values.

40. The device of Claim 34, further comprising transmitting said luminance values.

41. The device of Claim 34, wherein said data of said first format has one-half  
5 as many said three-color pixel elements horizontally and vertically as the display of said second format.

42. The device of Claim 34, wherein the display is selected from the group  
comprising liquid crystal displays, subtractive displays, OLEDs, electrophoretic displays,  
10 field emitter displays, discrete light emitting diode displays, plasma panel displays, EL displays, projectors, and cathode ray tube displays.